

# CLAIMS

1           1.       A method for providing automated diagnostic services for a cluster  
2 computer system comprising a plurality of nodes, each of the plurality of nodes  
3 providing an application to a plurality of clients, the method comprising the steps of:  
4           receiving a current value of a network parameter related to cluster middleware  
5 associated with the cluster computer system;  
6           analyzing the current value of the network parameter relative to a  
7 predetermined reference value for the network parameter; and  
8           providing information based on the analysis of the current value relative to the  
9 predetermined reference value.

1           2.       The method of claim 1, wherein the network parameter relates to a  
2 network heartbeat interval for a node in the cluster computer system and the  
3 predetermined reference value is an optimal network heartbeat interval for the node  
4 based on the current heartbeat link for the node.

1           3.       The method of claim 2, wherein the step of analyzing the current value  
2 of the network heartbeat interval relative to the optimal network heartbeat interval  
3 comprises determining whether the difference between the current value and the  
4 optimal network heartbeat interval is within a predetermined variance.





1           13.     The method of claim 12, wherein the step of providing information  
2     based on the analysis of the current value relative to the predefined threshold range for  
3     the node timeout value further comprises generating an instruction configured to set  
4     the node timeout value within the predefined threshold range.

1           14.     The method of claim 12, wherein the predetermined reference value  
2     further comprises a predefined recommended range and wherein the step of providing  
3     information based on the analysis of the current value relative to the predefined  
4     threshold range and the predefined recommended range further comprises, if the  
5     current value of the node timeout value is greater than the upper bound of the  
6     predefined threshold range, providing a warning that the node timeout value is too  
7     high and generating an instruction configured to set the node timeout value of the  
8     node to the upper bound of the predefined threshold range.

1           15.     The method of claim 12, wherein the predetermined reference value  
2     further comprises a predefined recommended range and wherein the step of providing  
3     information based on the analysis of the current value relative to the predefined  
4     threshold range and the predefined recommended range further comprises, if the  
5     current value of the node timeout value is greater than the upper bound of the  
6     predefined recommended range, determining whether an empirical condition  
7     associated with the cluster computer system exists that suggests the current value of  
8     the node timeout value should be greater than the upper bound of the predefined  
9     recommended range.

1           16.     The method of claim 15, further comprising the step of, if an empirical  
2     condition does not exist, providing a warning that the node timeout value is too high  
3     and generating an instruction configured to set the node timeout value of the node to  
4     the upper bound of the predefined threshold range.

1           17.     The method of claim 12, wherein the predetermined reference value  
2     further comprises a predefined recommended range and wherein the step of providing  
3     information based on the analysis of the current value relative to the predefined  
4     threshold range and the predefined recommended range further comprises, if the  
5     current value of the node timeout value is less than the lower bound of the predefined  
6     recommended range, determining whether an empirical condition associated with the  
7     cluster computer system exists that suggests the current value of the node timeout  
8     value should be less than the upper bound of the predefined recommended range.

1           18.     The method of claim 17, further comprising the step of, if an empirical  
2     condition does not exist, providing a warning that the node timeout value is too low  
3     and generating an instruction configured to set the node timeout value of the node to  
4     the lower bound of the predefined recommended range.

1           19.     The method of claim 12, wherein the predetermined reference value  
2     further comprises a predefined recommended range and wherein the step of providing  
3     information based on the analysis of the current value relative to the predefined  
4     threshold range and the predefined recommended range further comprises, if the  
5     current value of the node timeout value is not less than the lower bound of the  
6     predefined threshold range, providing a warning that the node timeout value is too low  
7     and generating an instruction configured to set the node timeout value of the node to  
8     the lower bound of the predefined threshold range.

1           20.     The method of claim 1, wherein the network parameter relates to an  
2     autostart timeout interval for a node in the cluster computer system and the  
3     predetermined reference value comprises a predefined range for the autostart timeout  
4     interval.

1           21.     The method of claim 20, wherein the step of analyzing the current  
2     value of the autostart timeout interval relative to the predefined range comprises  
3     determining whether the current value of the autostart timeout interval is within the  
4     predefined range.











1           40.     The system of claim 38, further comprising a fourth portion of logic  
2 configured to determine whether an alternative heartbeat link for the node is available  
3 if the difference between the current value and the optimal network heartbeat interval  
4 is not within the predetermined variance.

1           41.     The system of claim 38, further comprising a fourth portion of logic  
2 configured to repeat the first, second, and third portions of logic for another node in  
3 the cluster computer system if the difference between the current value and the  
4 optimal network heartbeat interval is within the predetermined variance.

1           42.     The system of claim 40, further comprising a fifth portion of logic  
2 configured to provide a warning of a potential failover recovery problem if an  
3 alternative heartbeat link for the node is not available.

1           43.     The system of claim 40, further comprising a fifth portion of logic  
2 configured to determine, if an alternative heartbeat link for the node is available, the  
3 optimal network heartbeat interval for the node based on the alternative heartbeat link  
4 for the node and analyze the current value of the network heartbeat interval relative to  
5 the optimal network heartbeat interval associated with the alternative heartbeat link  
6 for the node.

1008855-102601

1           44.     The system of claim 30, wherein the network parameter relates to a  
2     node timeout value for a node in the cluster computer system and the predetermined  
3     reference value comprises a predefined threshold range for the node timeout value.

1           45.     The system of claim 44, wherein the predefined threshold range for the  
2     node timeout value is based on a function of a network heartbeat interval for the node.

1           46.     The system of claim 45, wherein the third portion of logic is further  
2     configured to determine whether the current value of the node timeout value is within  
3     a predetermined variance.

1           47.     The system of claim 46, wherein the third portion of logic is further  
2     configured to provide a warning that the node timeout value is not within the  
3     predefined threshold range.

1           48.     The system of claim 47, wherein the third portion of logic is further  
2     configured to generate an instruction configured to set the node timeout value within  
3     the predefined threshold range.

1           49.     The system of claim 47, wherein the predetermined reference value  
2 further comprises a predefined recommended range and wherein the third portion of  
3 logic is further configured to, if the current value of the node timeout value is greater  
4 than the upper bound of the predefined threshold range, provide a warning that the  
5 node timeout value is too high and generate an instruction configured to set the node  
6 timeout value of the node to the upper bound of the predefined threshold range.

1           50.     The system of claim 47, wherein the predetermined reference value  
2 further comprises a predefined recommended range and wherein the third portion of  
3 logic is further configured to, if the current value of the node timeout value is greater  
4 than the upper bound of the predefined recommended range, determine whether an  
5 empirical condition associated with the cluster computer system exists that suggests  
6 the current value of the node timeout value should be greater than the upper bound of  
7 the predefined recommended range.

1           51.     The system of claim 50, further comprising a fourth portion of logic  
2 configured to, if an empirical condition does not exist, provide a warning that the node  
3 timeout value is too high and generate an instruction configured to set the node  
4 timeout value of the node to the upper bound of the predefined threshold range.

1           52.     The system of claim 47, wherein the predetermined reference value  
2 further comprises a predefined recommended range and wherein the third portion of  
3 logic is further configured to, if the current value of the node timeout value is less than  
4 the lower bound of the predefined recommended range, determine whether an  
5 empirical condition associated with the cluster computer system exists that suggests  
6 the current value of the node timeout value should be less than the upper bound of the  
7 predefined recommended range.

1           53.     The system of claim 52, wherein the third portion of logic is further  
2 configured to, if an empirical condition does not exist, provide a warning that the node  
3 timeout value is too low and generate an instruction configured to set the node timeout  
4 value of the node to the lower bound of the predefined recommended range.

1           54.     The system of claim 47, wherein the predetermined reference value  
2 further comprises a predefined recommended range and wherein the third portion of  
3 logic is further configured to, if the current value of the node timeout value is not less  
4 than the lower bound of the predefined threshold range, provide a warning that the  
5 node timeout value is too low and generate an instruction configured to set the node  
6 timeout value of the node to the lower bound of the predefined threshold range.

1           55.     The system of claim 30, wherein the network parameter relates to an  
2     autostart timeout interval for a node in the cluster computer system and the  
3     predetermined reference value comprises a predefined range for the autostart timeout  
4     interval.

1           56.     The system of claim 55, wherein the second portion of logic is further  
2     configured to determine whether the current value of the autostart timeout interval is  
3     within the predefined range.

1           57.     The system of claim 56, wherein the third portion of logic is further  
2     configured to, if the current value of the autostart timeout interval is above the upper  
3     bound of the predefined range, provide an instruction configured to decrease the  
4     autostart timeout interval of the node.

1           58.     The system of claim 56, wherein the third portion of logic is further  
2     configured to, if the current value of the autostart timeout interval is below the lower  
3     bound of the predefined range, provide an instruction configured to increase the  
4     autostart timeout interval of the node.

1           59.     The system of claim 56, wherein the second portion of logic is further  
2     configured to determine whether the current value of the autostart timeout interval is  
3     within the predefined range is performed after determining that a cluster unification  
4     process has been initiated during reboot of the node.

1           60.     The system of claim 30, wherein the network parameter relates to a  
2 network polling interval for a node in the cluster computer system and the  
3 predetermined reference value comprises a predefined range for the network polling  
4 interval.

1           61.     The system of claim 60, wherein the second portion of logic is further  
2 configured to determine whether the current value of the network polling interval is  
3 within the predefined range.

1           62.     The system of claim 61, wherein the third portion of logic is further  
2 configured to, if the current value of the network polling interval is above the upper  
3 bound of the predefined range, provide an instruction configured to decrease the  
4 network polling interval of the node.

1           63.     The system of claim 61, wherein the third portion of logic is further  
2 configured to, if the current value of the network polling interval is below the lower  
3 bound of the predefined range, provide an instruction configured to increase the  
4 network polling interval of the node.

1           64.     The system of claim 61, wherein the second portion of logic is further  
2 configured to determine whether the current value of the network polling interval is  
3 within the predefined range is performed after determining that the network polling  
4 has been set.